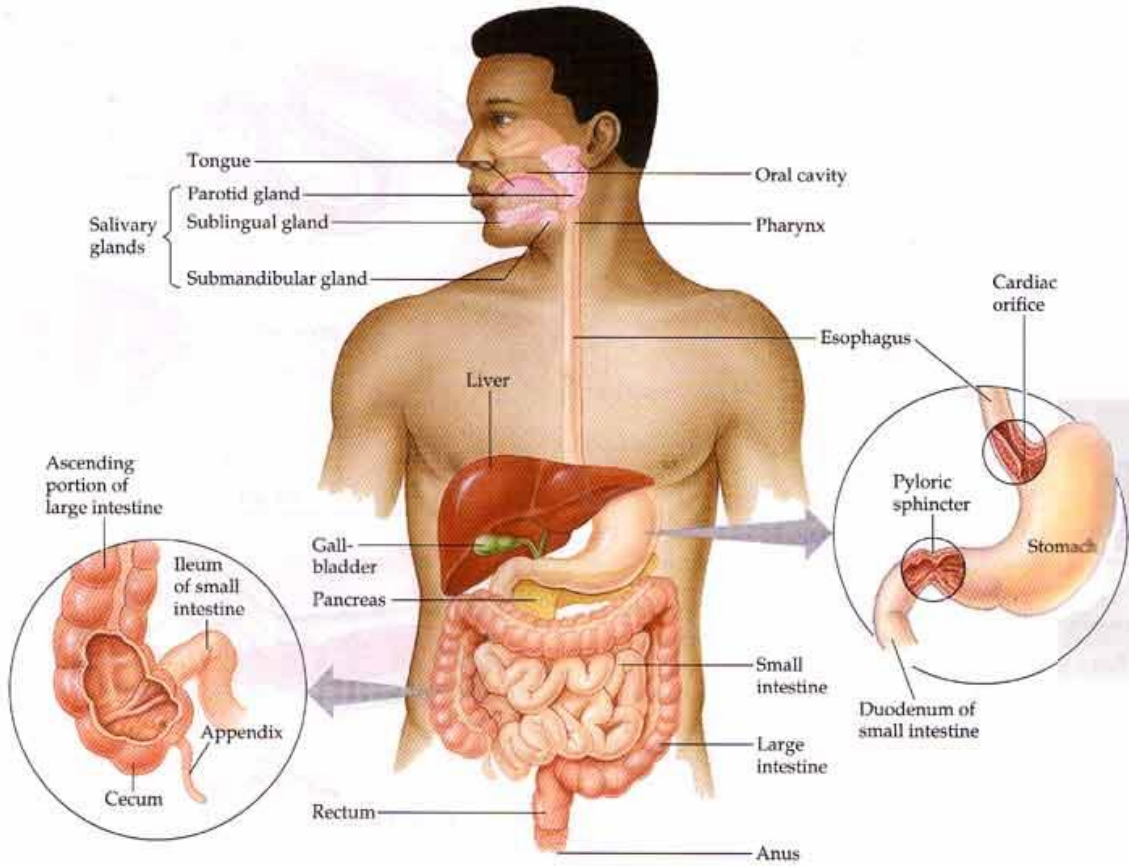
Ch 23: Digestive System, Part 2

Objectives:

Discuss the general functions and anatomy of the **digestive tract,** including accessory structures.

First, an overview of the tubular nature of the digestive system.

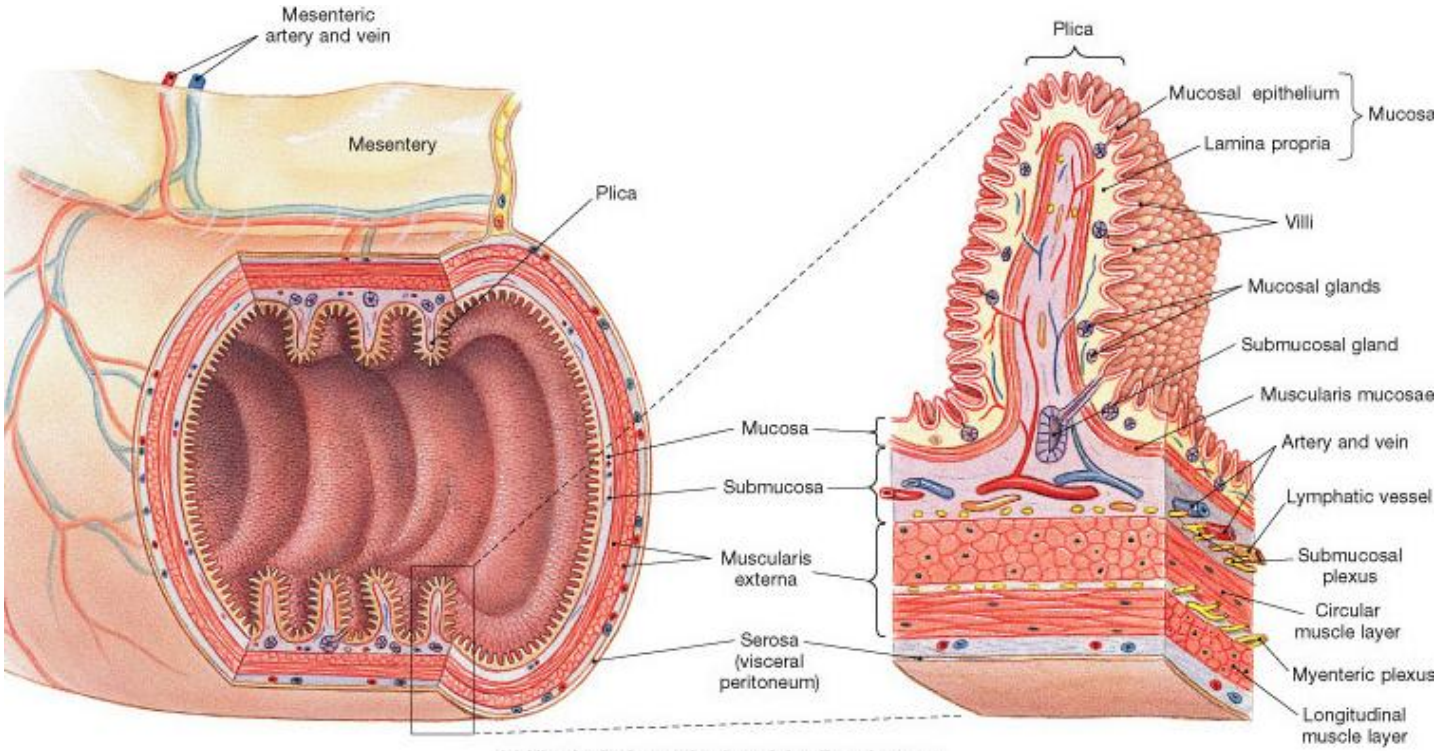
Describe the **individual organs** of the system, including a discussion of the gross and microscopic anatomy.



Developed by
John Gallagher, MS, DVM

LAS POSITAS COLLEGE

General Organization of a Tubular Organ (Repetio est….)



(a) Histological organization of the digestive tract

The 4 Layers of the Gut (review)

1) **Mucosa**

Epithelium - usually simple columnar with goblet cells; may be stratified squamous if protection needed

Lamina propria – areolar connective tissue deep to epithelium

Muscularis mucosae -produces folds - **plicae** (small intestine) or **rugae** (stomach)

2) **Submucosa** – made up of loose connective tissue contains submucosal plexus and blood vessels

3) **Muscularis externa** – smooth muscle, usually two layers (controlled by the myenteric plexus; source of peristalsis) -

inner layer: circular

outer layer: longitudinal

4) **Serosa**

visceral layer of mesentery (contiguous with the peritoneum) or adventitia depending on location

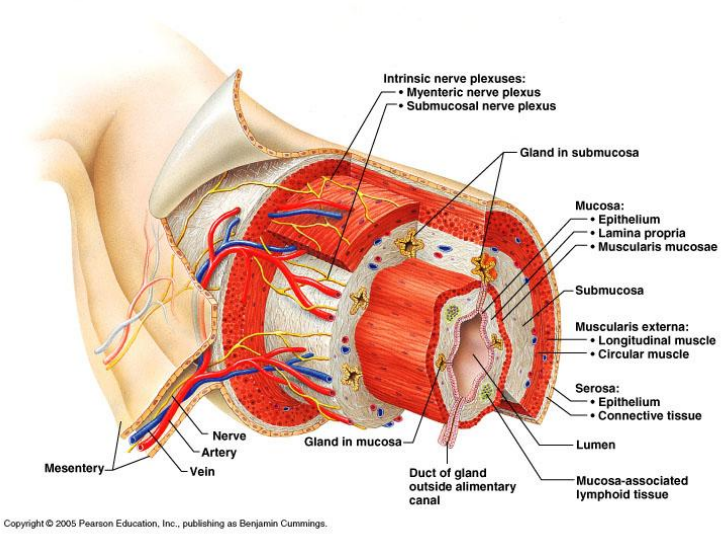


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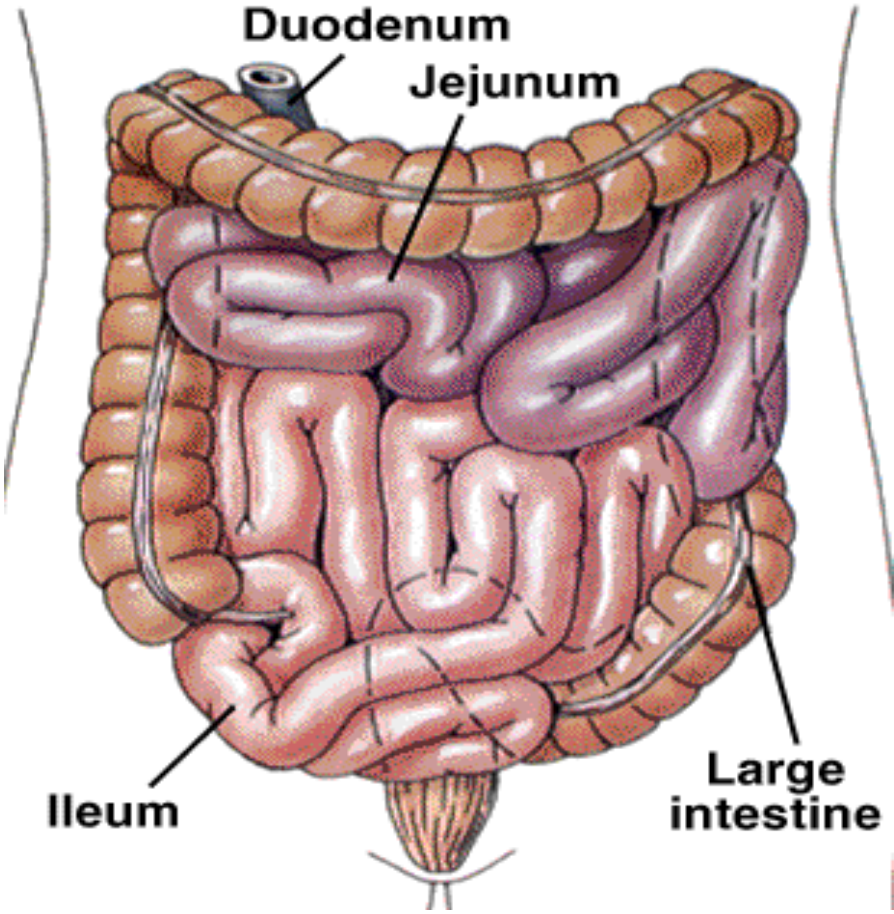
Fig 23.7

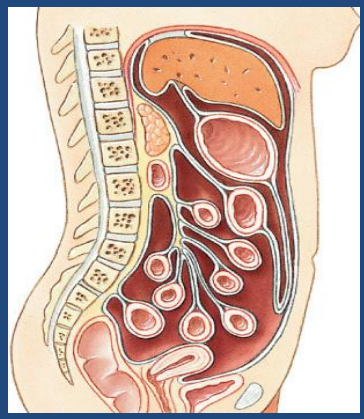
Regions of Small Intestine

SI is longest part of alimentary canal. Almost all absorption of nutrients is in SI, with a few important exceptions.

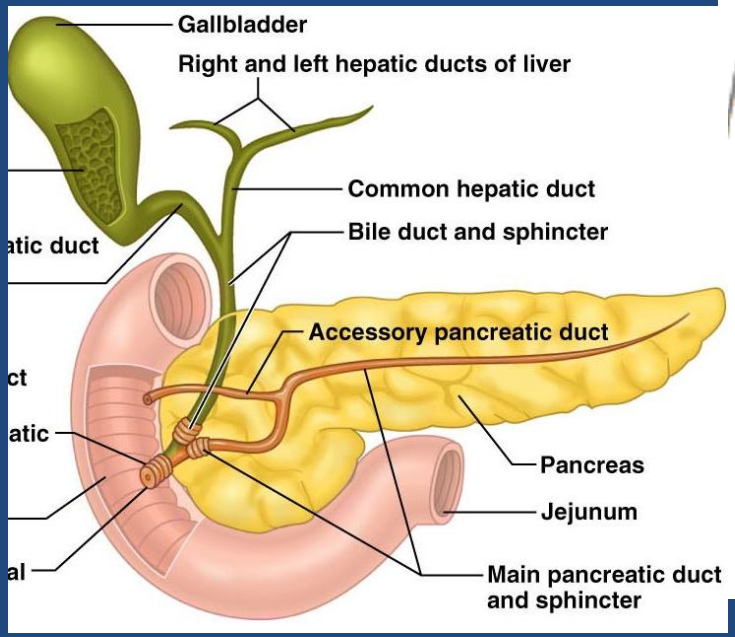
1. **Duodenum**
2. **Jejunum**
3. **Ileum**

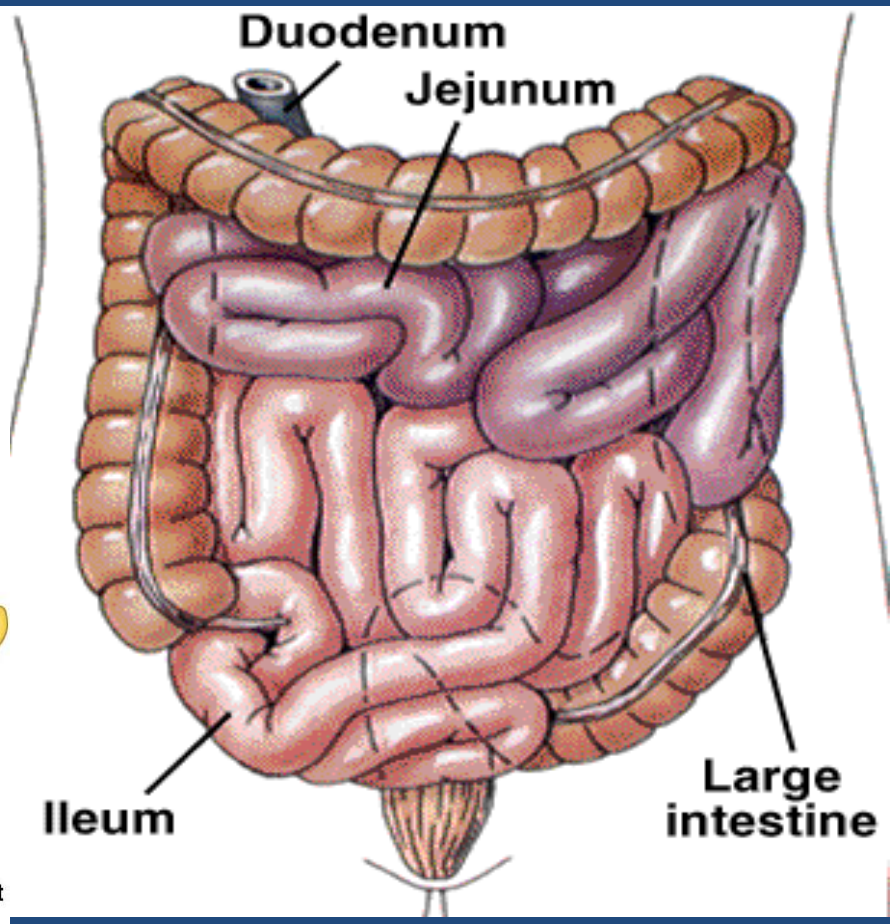


Regions of Small Intestine



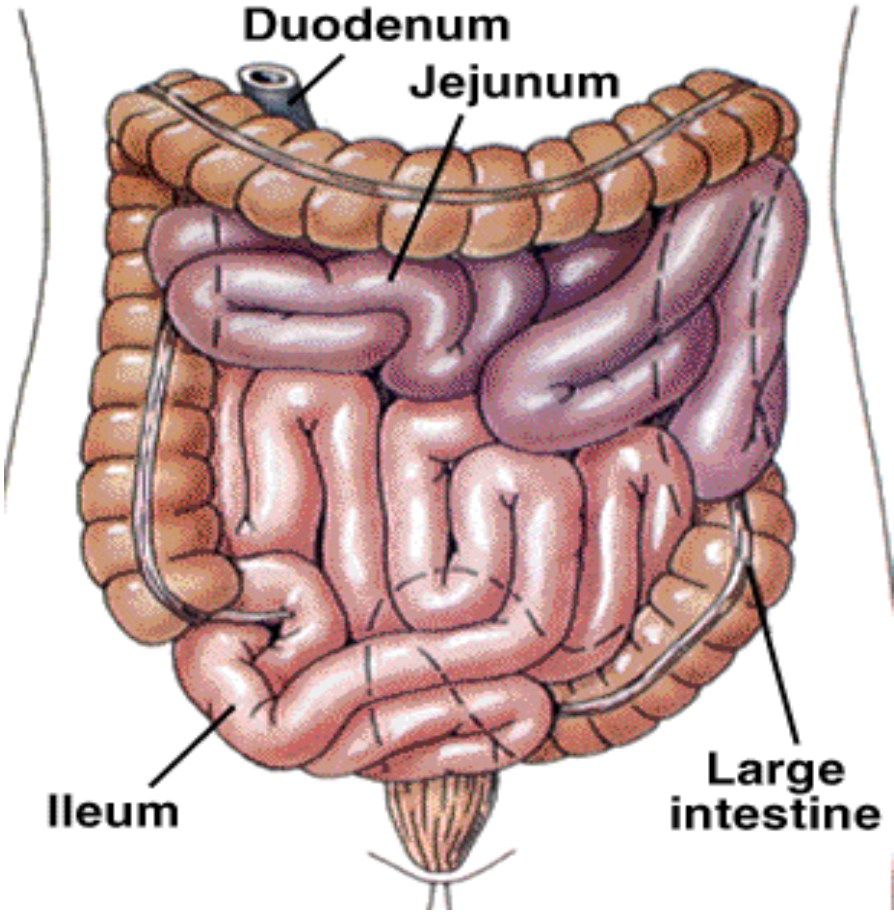
1. **Duodenum** (short, 12 inches)
   - Mostly retroperitoneal
     - fixed shape & position
   - Mixing bowl for chyme & ?
   - Entry of bile duct at the duodenal papilla





Regions of Small Intestine

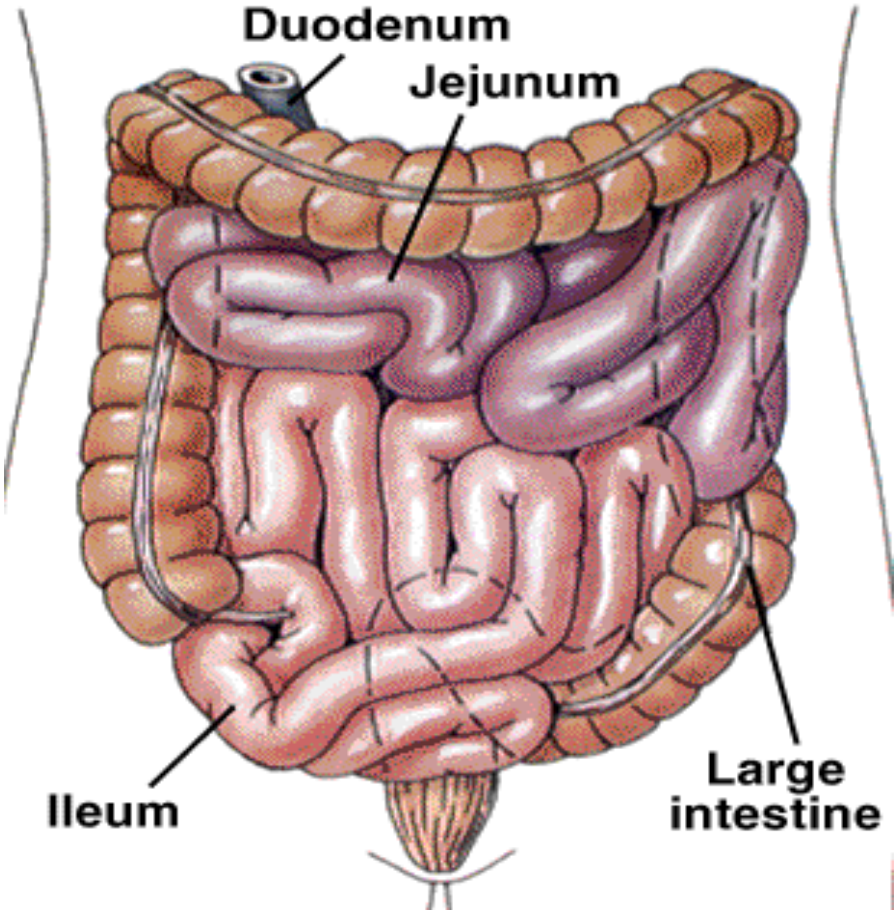
2. **Jejunum** (2.5 m long)
   - Most of digestion
   - Mostly superior to the ileum



Regions of Small Intestine

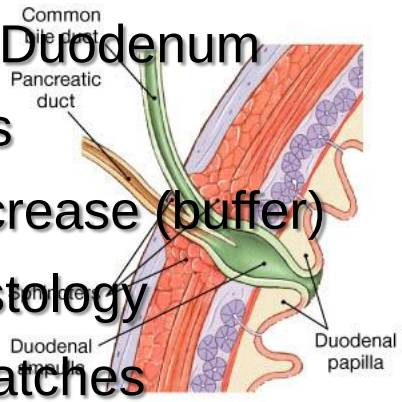
3. **Ileum** (longest at 3.5 m)
   - Most of absorption, ends in

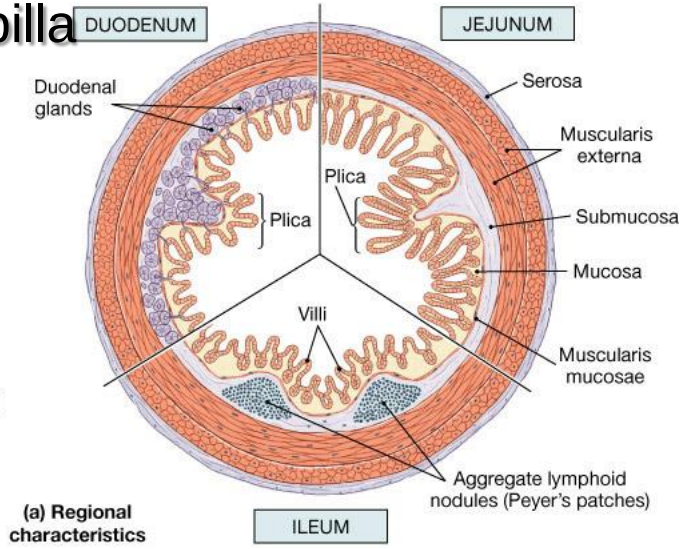
Ileocecal valve – slit valve into large intestine (colon)



Comparative Histology

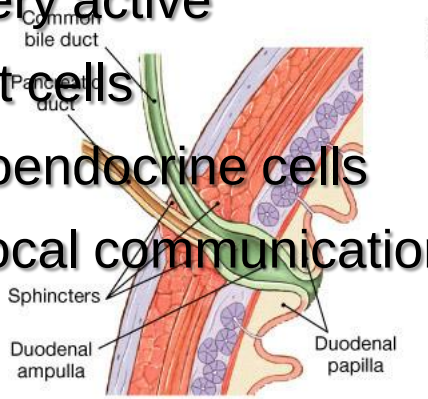
- Note Bile and Pancreatic Ducts in Duodenum, Duodenal papilla
- Glands in Duodenum
  - Mucus
  - pH increase (buffer)
- Similar histology
- Peyer's Patches
  - AKA MALT

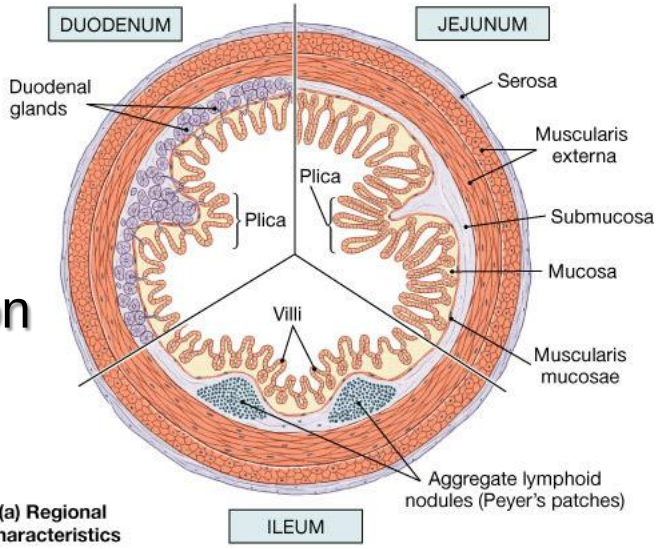




Comparative Histology, cont'd

- Specialized Cells
  - Absorptive cells
    - Very active
  - Goblet cells
  - Enteroendocrine cells
    - Local communication

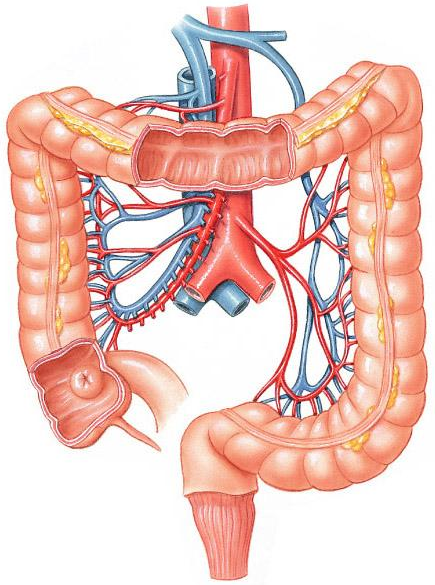




- N.B. hepatopancreatic sphincter

Large Intestine = Large Bowel = Colon = 1.5 meters

- **Cecum**
  - pocket at proximal end with **Vermiform Ap in LRQ**
  - **Appendicitis p 669**
- **Ileocecal Valve**
  - **Opens when stomach is filling**
  - **Prevents fecal reflux into ileum**



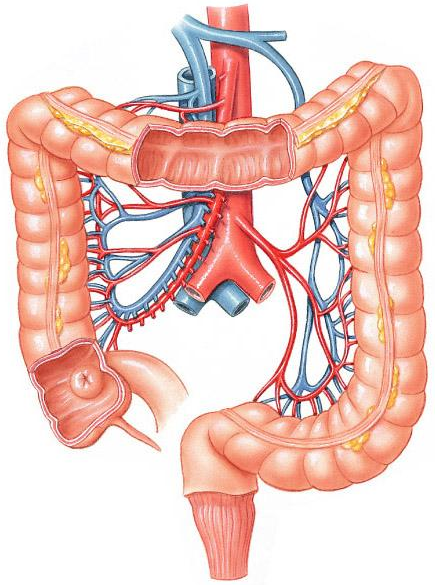
Large Intestine = Large Bowel = Colon = 1.5 meters

Ascending colon - on right, between cecum and right colic flexure

Transverse colon - horizontal portion

Descending colon - left side, between lef flexure and

Sigmoid colon - S bend near terminal enc



Large intestine, cont'd

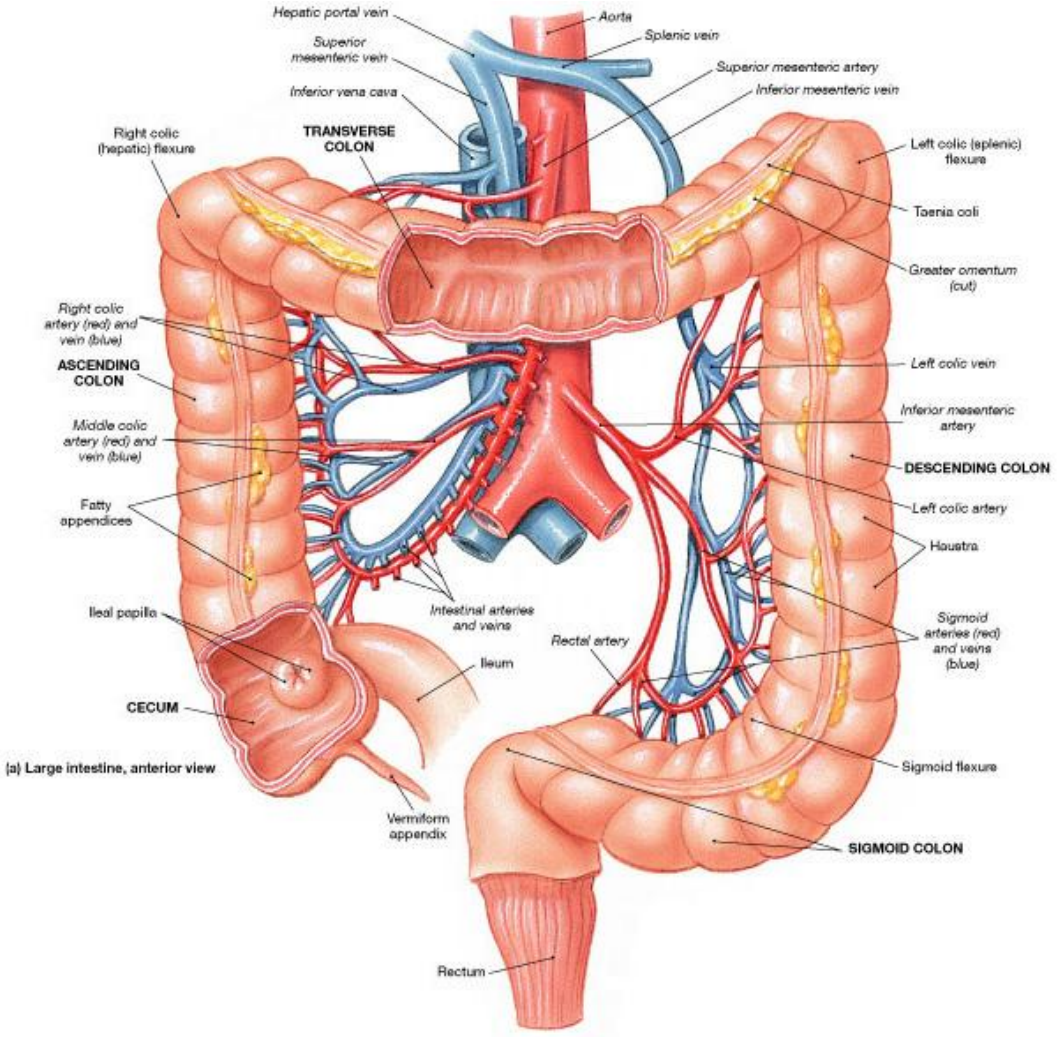
1. Mucosa - simple columnar epith with abundant goblet cells; stratified squamous epithelium near anal canal

2. No villi

3. Longitudinal muscle layer incomplete, forms three bands or **taenia coli**

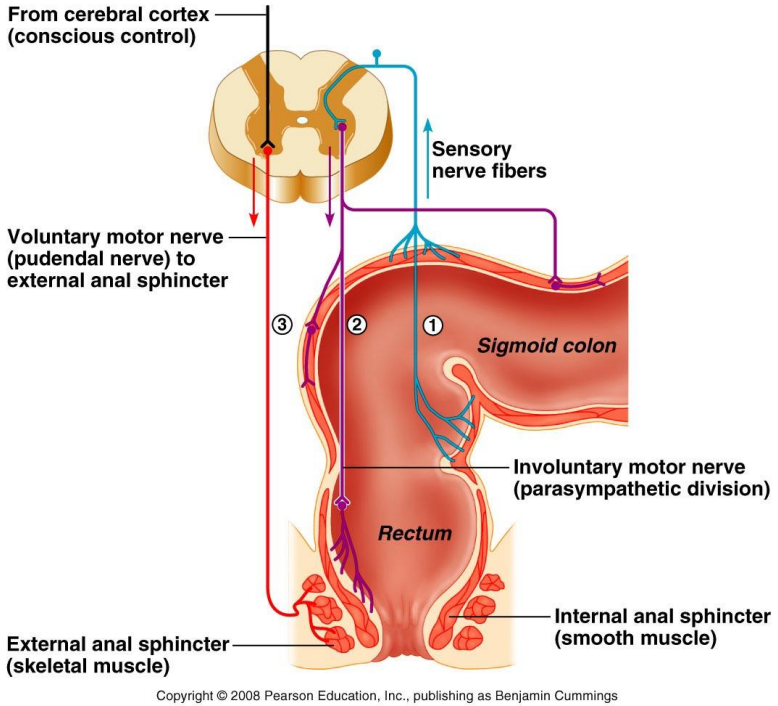
4. Circular muscle - forms pockets or **haustra** between bands

5. Anal Sphincter



Rectum and Anus

- **Rectum** – terminal end is anal canal - ending at the anus -
  - which has internal involuntary sphincter and external voluntary sphincter
  - Retroperitoneal
  - Mucus glands
  - Rectal and Anal valves



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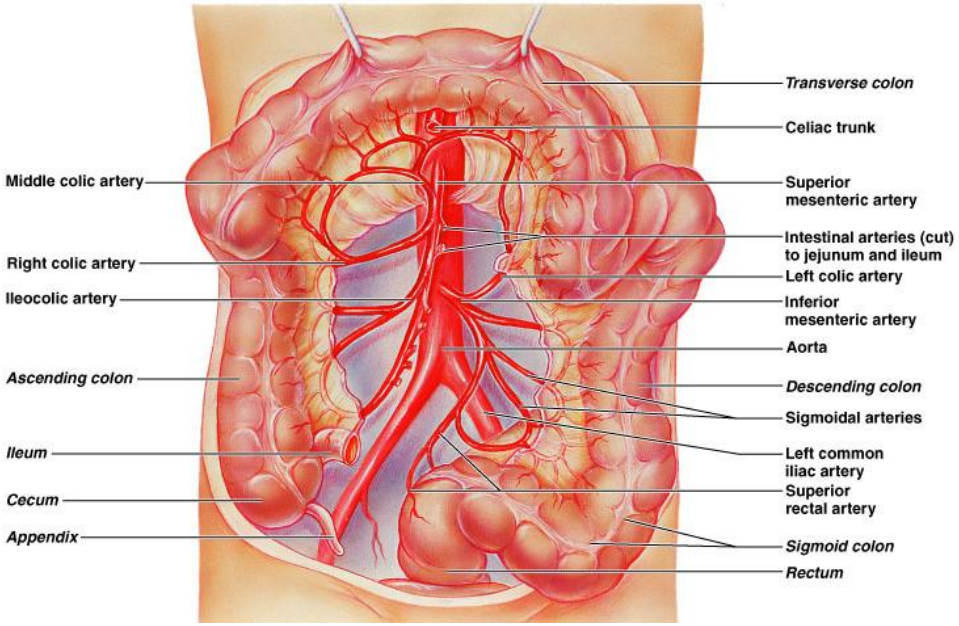
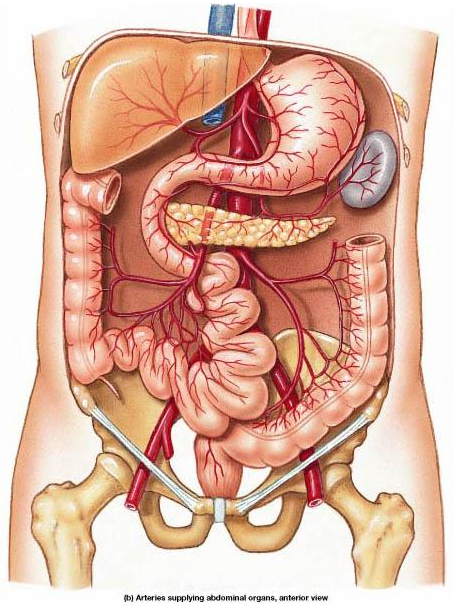
Blood Supply

Celiac trunk - 3 branches – to liver, gallbladder, esophagus, stomach, duodenum, pancreas, and spleen

Superior mesenteric– to pancreas and duodenum, small intestine and part of colon

Inferior mesenteric– to colon

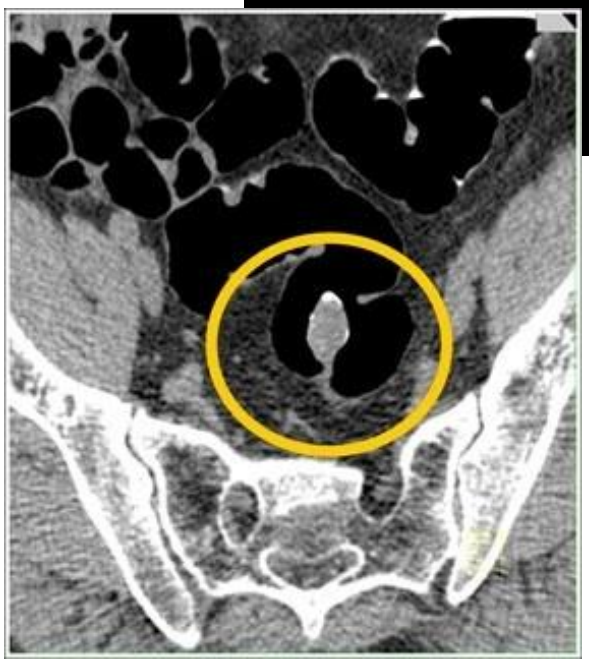



(b) Arteries supplying abdominal organs, anterior view

Colorectal Polyps

Generally benign
Asymptomatic
May bleed
May be precancerous

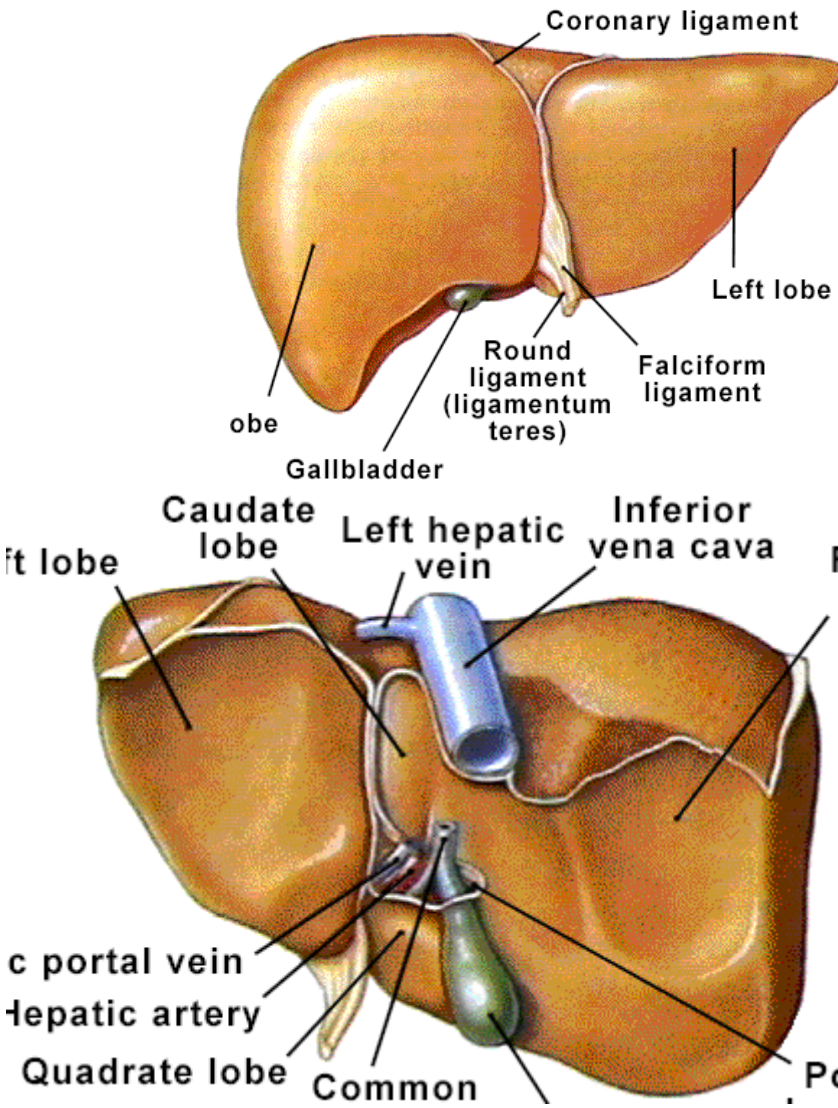
Colonoscopy



http://www.youtube.com/watch?v=lQfuAP3YqPQ&feature=related

Liver

- Located in RUQ, adjacent to the diaphragm, largest organ made up of 4 lobes (left and right, caudate, and quadrate)
- Falciform ligament (remnant of fetal blood supply
- Hilus (porta hepatis) – "entry" point on the visceral surface

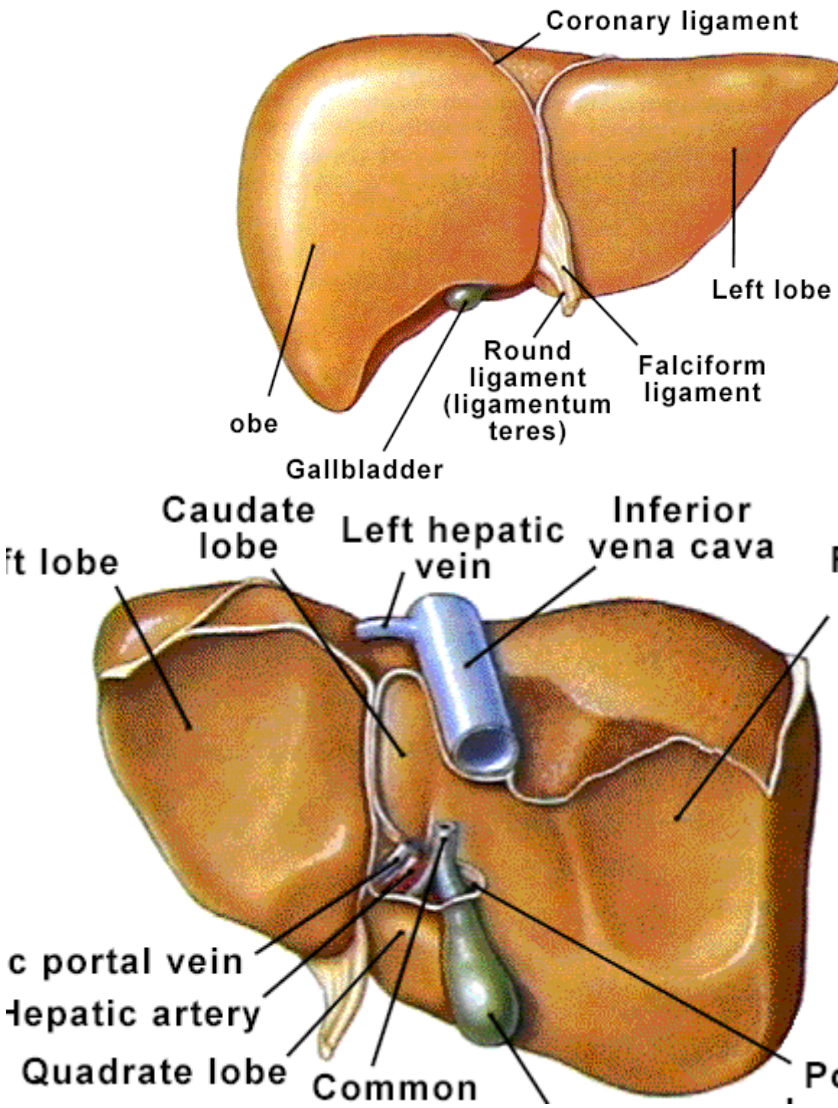


Liver, cont'd

Extremely versatile: Know a few functions?

Gall bladder-storage of bile

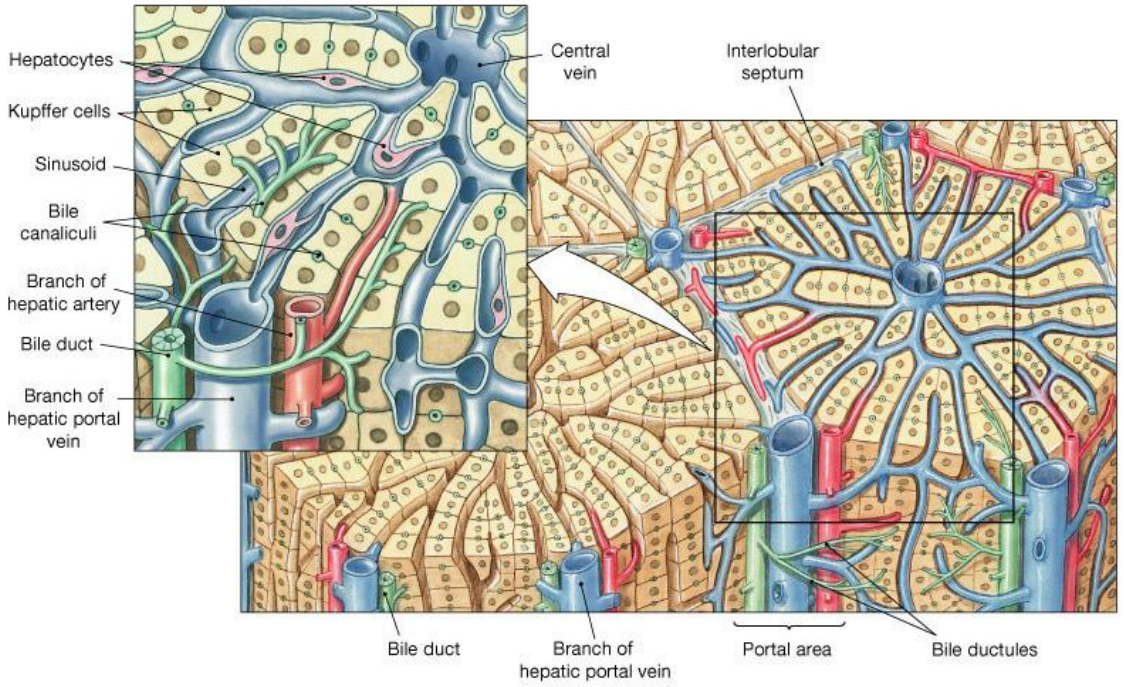
Blood supply: hepatic artery (1/3) and portal vein (2/3); Return via Central V. to vena cava



Microscopic anatomy: Liver lobules and portal triads

See Fig 23.26

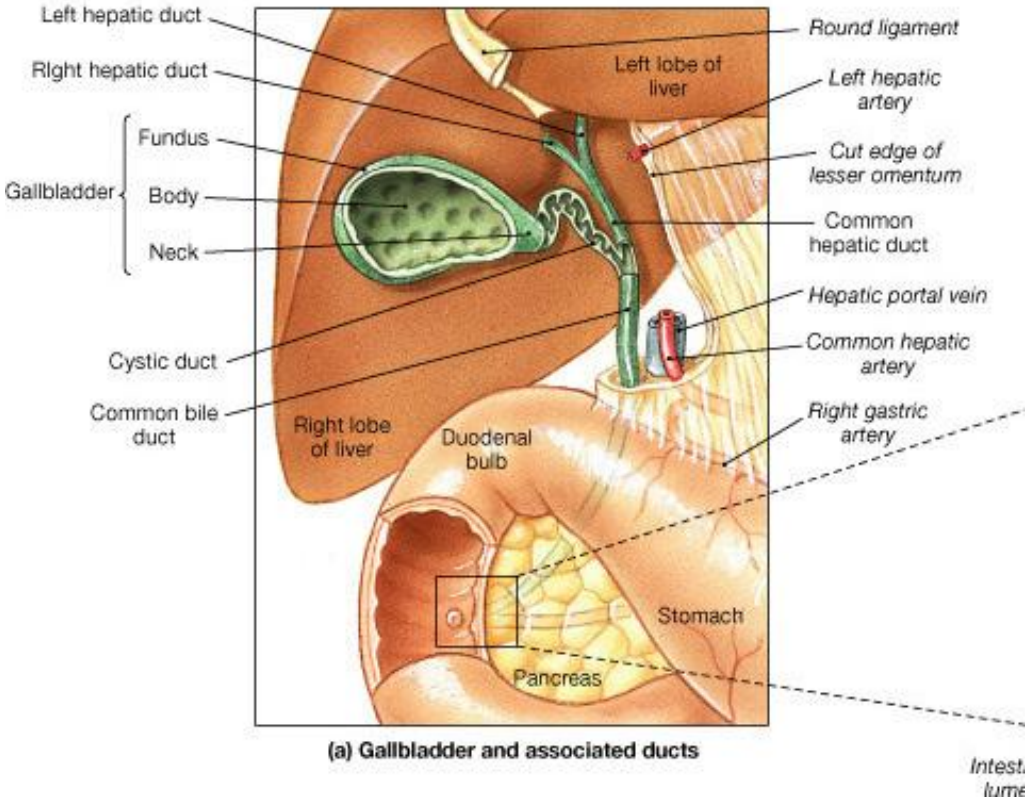
- 100,000 Lobules (the basic functional unit)
- Hepatocytes are arranged like spokes in a hexagonal wheel
- Bathed in blood of hepatic sinusoids
  - From Portal V. and Hepatic A.
  - Triads at each corner
- Kupffer Cells are phagocytic



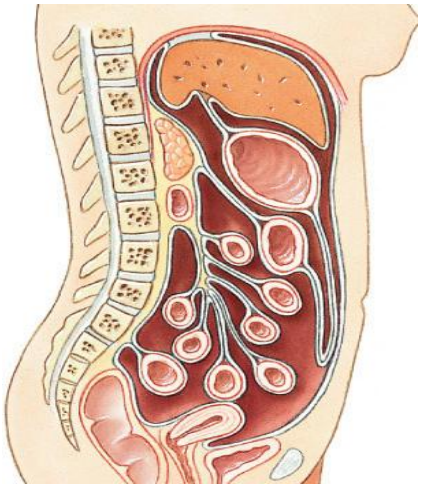
(a) Lobular organization

Gall Bladder

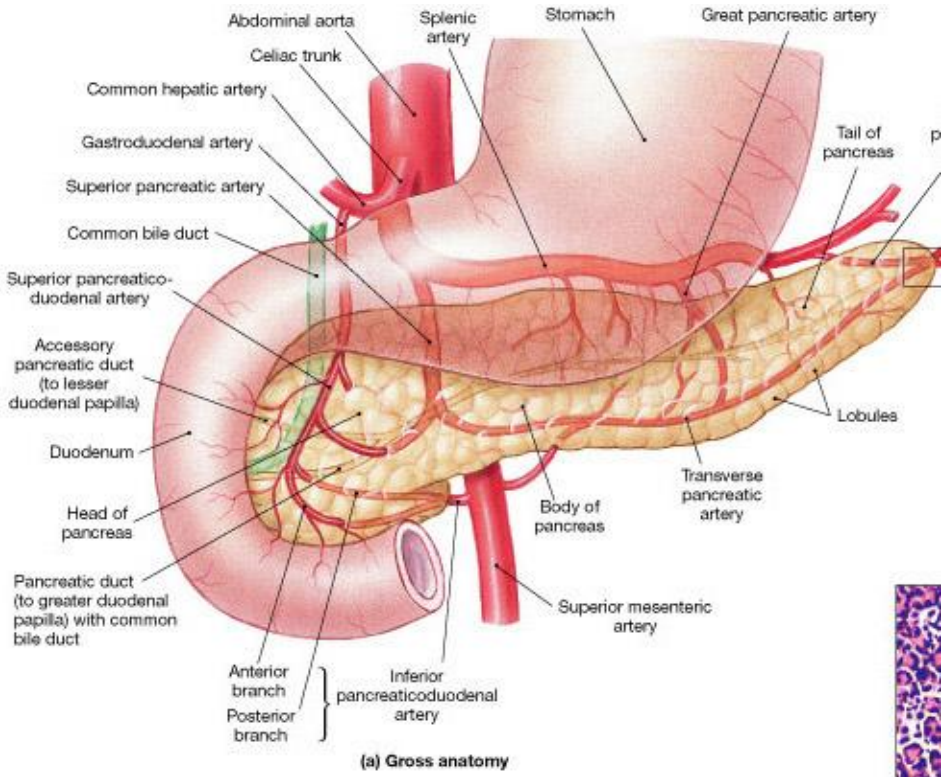
- Fundus, body, neck
- Hepatic Duct and Cystic duct connect to form the Common Bile Duct
- Enters at the proximal duodenum
- Storage and Concentration of Bile



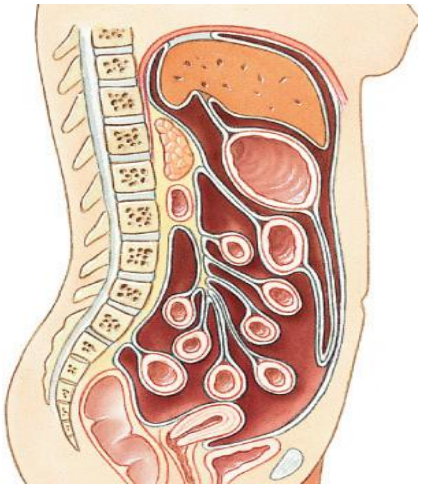
Pancreas



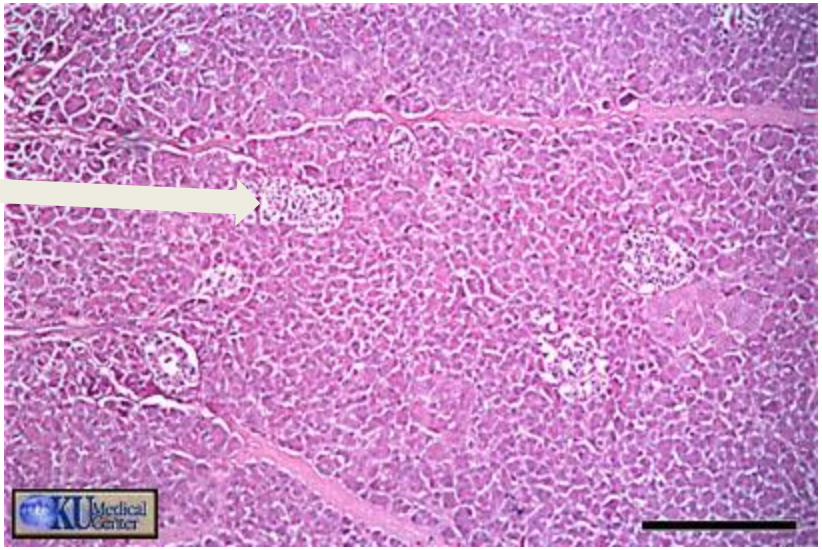
- **Retroperitoneal**
- **Endocrine or exocrine gland? Both!**
  - **Only 1% is endocrine**
    - **Insulin, et al.**
- **Simple Cuboidal Epith arranged in Acini**
- **Digestive enzymes excreted into the pancreatic duct**
- **Common bile duct and pancreatic duct lead to duodenal ampulla and papilla**
  - **Controlled by hepatopancreatic sphincter**

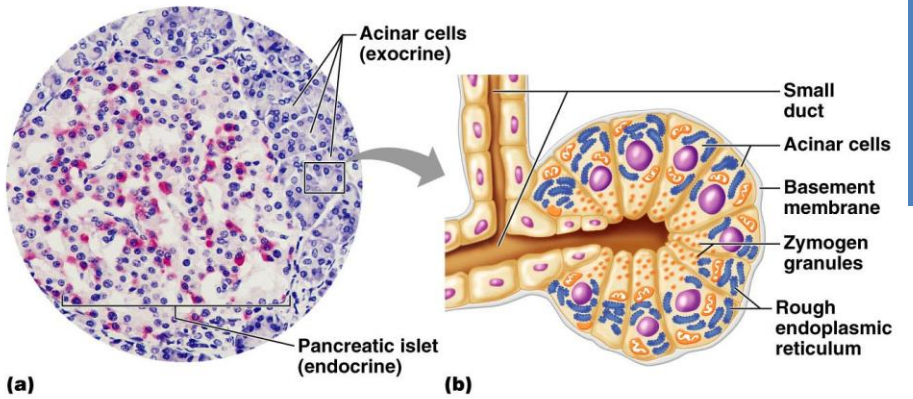


Pancreas, cont'd



- **Acinar Cells**
  - Several types of digestive enzymes e.g., trypsin
  - Used as diagnostic tools for pancreatitis
- **Islets of Langerhans**
  - AKA pancreatic islets
  - Insulin, other hormones
  - Chapt 25





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